

Anxious temperament and anxiety during pregnancy as predictors of preterm birth and low birth weight: A prospective study

Anxious temperament and anxiety in pregnancy

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Abstract

Aim: This study aimed to examine the association between affective temperament traits and antenatal anxiety with adverse pregnancy outcomes, specifically preterm birth and low birth weight.

Materials and Methods: A prospective observational study was conducted between April and June 2016 at the Obstetrics Outpatient Clinic of Necmettin Erbakan University Faculty of Medicine. A total of 233 healthy pregnant women between the 28th and 30th gestational weeks were included. Anxiety levels and temperament types were assessed using the Hospital Anxiety and Depression Scale (HADS) and the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego Autoquestionnaire (TEMPS-A). Preterm birth was defined as delivery before 37 weeks of gestation, and low birth weight as less than 2500 grams. **Results:** Anxiety and depression were reported in 47% and 32% of participants. A weak positive correlation was found between anxious temperament and both gestational age and birth weight (correlation coefficients: 0.217 and 0.189). A statistically significant association was identified between low birth weight and anxious temperament scores ($p = 0.021$). Additionally, a significant relationship was observed between preterm birth and anxious temperament ($p < 0.001$). According to the HAD scale, the prevalence of anxiety among participants was 20.86%, while depression was 17.39%.

Discussion: Anxious temperament and antenatal anxiety are associated with a higher risk of preterm birth and low birth weight. These adverse outcomes could potentially be mitigated through early intervention and routine psychological screening during pregnancy.

Keywords

anxiety, low birth weight, maternal anxiety, preterm birth

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This study was approved by the Ethics Committee of Necmettin Erbakan University, Meram Faculty of Medicine (Date: 2016-06-23, No: 2016/518)

Introduction

Pregnancy represents a complex biopsychosocial process involving significant physiological, hormonal, and psychological changes. Although it is often considered a natural stage of life, this period may be marked by heightened psychological vulnerability, including emotional reactivity and mood disturbances. Previous research has established associations between prenatal anxiety and depressive symptoms and adverse perinatal outcomes such as preterm birth and low birth weight [1-3].

Preterm labor affects approximately 12-13% of pregnancies in the United States and 5-9% in Europe. While biomedical risk factors for preterm birth and low birth weight have been extensively studied, there is growing recognition of the role played by psychosocial contributors, such as anxiety, depression, and inadequate social support. However, the influence of psychosocial variables, particularly maternal temperament, remains underexplored. Temperament refers to stable emotional and behavioral predispositions that influence an individual's response to stress.

In accordance with the framework proposed by Akiskal, affective temperament is categorized into five principal subtypes: depressive, hyperthymic, cyclothymic, irritable, and anxious [4]. These subtypes represent stable emotional and behavioral tendencies that have consistently been associated with psychiatric disorders, particularly mood and anxiety disorders. The hyperthymic profile is distinguished by an early onset of elevated mood, reduced sleep duration, and a predominant reliance on denial as a defense mechanism. In contrast, the irritable subtype is characterized by chronic pessimism and a judgmental cognitive style, frequently linked to antisocial personality traits and attention-deficit/hyperactivity disorder. Cyclothymic temperament is marked by rapid and unpredictable mood shifts, signifying a biphasic affective structure. The depressive subtype is delineated by persistent anhedonia, disrupted appetite, pervasive feelings of worthlessness, and suicidal ideation. An anxious temperament is characterized by sustained and excessive worry, often accompanied by somatic symptoms such as tachycardia and chest tightness, with symptoms persisting for more than six months.

Among these affective temperaments, anxious temperament may be particularly relevant during pregnancy due to its association with heightened physiological arousal and increased stress sensitivity. To date, most studies have concentrated on transient anxiety symptoms, whereas the impact of enduring temperamental traits on obstetric outcomes remains insufficiently understood [5,6].

This study investigates the relationship between anxious temperament and adverse obstetric outcomes, with the hypothesis that anxious temperament is a significant predictor of preterm birth and low birth weight. Understanding the role of enduring personality traits, as opposed to transient emotional states, may contribute to early identification and improved perinatal care.

Materials and Methods

Study Design and Participants

This prospective observational study was conducted between

April and June 2016 at the Obstetrics Outpatient Clinic of Necmettin Erbakan University Faculty of Medicine. A total of 233 pregnant women between 28 and 30 weeks of gestation were included. Inclusion criteria were absence of physical disabilities, no psychiatric diagnosis or treatment, non-assisted pregnancy, and delivery at the university hospital.

Ethical approval was obtained from the Ethics Committee (Decision No: 2016/518), and written informed consent was received from all participants.

Measurements

Anxiety levels were measured using the Hospital Anxiety and Depression Scale (HADS), originally developed by Zigmond and Snaith and validated in Turkish by Aydemir et al. [7,8].

Affective temperament was assessed using the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego Autoquestionnaire (TEMPS-A), developed by Akiskal et al. and validated for the Turkish population by Vahip et al. [9,10].

Additionally, a personal information form developed by the researchers was used to collect demographic and clinical information such as maternal age, gestational week, parity, and obstetric history.

Statistical Analysis

All statistical analyses were performed using SPSS 15.0 (SPSS Inc., Chicago, IL, USA). Before performing group comparisons, the normality of continuous variables was tested using the Kolmogorov-Smirnov test and visual methods (histogram, Q-Q plots). Since the data were not normally distributed, non-parametric tests were employed. Descriptive statistics (mean, standard deviation, frequency) were used to summarize data. Differences between the two groups were analyzed using the Mann-Whitney U test. Associations between variables were evaluated using Spearman's rank correlation coefficient. A p-value of less than 0.05 was considered statistically significant.

Ethical Approval

This study was approved by the Ethics Committee of Necmettin Erbakan University, Meram Faculty of Medicine (Date: 2016-23-06, No: 2016/518).

Informed Consent

Written informed consent was obtained from all participants after they were informed about the purpose and procedures of the study.

Results

The study included 233 pregnant women aged 17 to 46 years (mean age = 27.57 ± 5.76). Educational attainment varied, with 41.2% having completed primary education, 37.3% secondary education, and 21.5% holding a university degree. Primiparous participants comprised 57.1% of the sample (Table 1).

Preterm birth occurred in 20.6% of cases, and low birth weight was observed in 21.5%. The mean gestational age at delivery was 37.8 ± 3.6 weeks, and the average neonatal birth weight was 2812 ± 710 grams. Affective temperament types were distributed as follows: depressive (12.9%), cyclothymic (1.7%), hyperthymic (0.9%), and irritable (1.7%) (Table 2).

An anxious temperament was significantly associated with both preterm birth ($p < 0.001$) and low birth weight ($p = 0.021$). No significant relationships were found between other temperament types and adverse outcomes. A moderate

Table 1. Demographic Characteristics of Participants

Category	Detail / Value
Sample Size	233 pregnant women
Age (years)	17-46 (Mean = 27.57 ± 5.76)
Educational Status	Primary: 41.2% (n = 96)
	Secondary: 37.3% (n = 87)
	University: 21.5% (n = 50)
Parity	Primiparous: 57.1% (n = 133)
	Multiparous: 42.9% (n = 100)

Table 2. Pregnancy Outcomes and Affective Temperament Types

Variable	n	% / Mean ± SD
Preterm Birth	48	20.6
Low Birth Weight	50	21.5
Gestational Age at Birth (weeks, mean ± SD)	–	37.8 ± 3.6
Neonatal Birth Weight (g, mean ± SD)	–	2812 ± 710
- Depressive	30	12.9
- Cyclothymic	4	1.7
- Hyperthymic	2	0.9
- Irritable	4	1.7

positive correlation was identified between gestational age and birth weight ($r = 0.649$). According to the Hospital Anxiety and Depression (HAD) scale, the prevalence of anxiety among participants was 20.86%, while the prevalence of depression was 17.39%.

Discussion

Anxious temperament is a stable and enduring personality trait characterized by heightened behavioral and physiological responsiveness to environmental stressors. Individuals with this temperament often exhibit prolonged and exaggerated activation of the hypothalamic-pituitary-adrenal (HPA) axis in response to stress, leading to sustained elevations in cortisol and other glucocorticoids [11]. During pregnancy, chronic HPA axis activation may disrupt maternal-fetal interactions, impacting placental function, fetal growth, and neurodevelopment. Elevated maternal cortisol has been associated with impaired placental enzyme activity, increased uterine contractility, altered fetal HPA axis programming, and changes in inflammatory cytokine profiles, all of which can contribute to adverse obstetric outcomes such as preterm birth and low birth weight [12,13].

Several studies have documented the association between maternal stress, anxiety, and negative perinatal outcomes. Yamamoto et al. identified maternal stress as an independent predictor of reduced gestational age and lower birth weight [14]. Grigoriadis et al. emphasized the predictive role of antenatal anxiety in adverse birth outcomes, highlighting its clinical significance [2]. Dayan et al. reported that elevated state and trait anxiety, along with depressive symptoms, were significantly associated with increased risk of preterm labor [15]. Consistent with these findings, our study indicates that anxious temperament, representing a stable, enduring trait,

may be a more reliable predictor of adverse obstetric outcomes than transient mood or anxiety symptoms. In our cohort, anxious temperament was significantly associated with both preterm birth and low birth weight, whereas other temperamental traits and antenatal depressive symptoms did not show such associations. These findings underscore the importance of considering stable personality characteristics in obstetric risk assessments, beyond transient psychological states.

Dole et al. reported that antenatal depression was not significantly correlated with preterm labor, whereas maternal anxiety doubled the risk of preterm delivery [16]. This emphasizes the independent role of anxiety as a psychological risk factor during pregnancy. Our results further reinforce this concept, showing that anxious temperament contributes significantly to negative obstetric outcomes. Importantly, the relationship between anxiety and adverse birth outcomes may be bidirectional: psychological distress may increase the likelihood of preterm delivery, while the experience of prematurity may itself exacerbate maternal anxiety and stress. Prospective longitudinal studies are needed to clarify the temporal and causal relationships underlying these associations.

Mechanistically, anxious temperament may influence pregnancy outcomes through both physiological and behavioral pathways. Physiologically, chronic stress and elevated glucocorticoids can impair placental perfusion, dysregulate inflammatory cytokines, and alter fetal growth trajectories, contributing to prematurity and low birth weight. Behavioral pathways may include maladaptive coping strategies, heightened health-related anxiety, sleep disturbances, poor nutrition, reduced adherence to prenatal care recommendations, and avoidance behaviors, all of which can further exacerbate obstetric risk. Additionally, anxious temperament may interact with other psychosocial factors, such as social support, marital satisfaction, and socioeconomic stressors, amplifying its impact on maternal and neonatal outcomes.

Pregnancy, although a natural life event, represents a period of heightened psychological vulnerability. While most women adapt successfully to the physiological, hormonal, and social changes of pregnancy, a subset may experience excessive emotional burden, resulting in impaired daily functioning, social withdrawal, and increased risk of psychiatric disorders requiring clinical intervention [17]. Identifying women with high-risk temperamental profiles, particularly those with anxious tendencies, provides an opportunity for early intervention, potentially mitigating negative obstetric outcomes.

From a clinical perspective, integrating temperament-focused psychological assessments into routine prenatal care could improve early identification of at-risk women. Structured follow-ups by nurses or midwives, psychoeducational programs focusing on stress management, cognitive behavioral interventions, and peer support networks may collectively reduce emotional distress, enhance maternal well-being, and improve neonatal outcomes. Strengthening family, partner, and community support systems may also buffer the effects of anxious temperament on obstetric risk. Furthermore, early identification of high-risk temperamental profiles may guide targeted interventions, such as referral to mental health services, mindfulness-based stress reduction, or coping skills

training, thereby contributing to improved perinatal care [18,19].

In conclusion, our findings indicate a robust association between anxious temperament and adverse obstetric outcomes, including preterm birth and low birth weight. These results highlight the importance of evaluating enduring personality traits alongside transient psychological states during pregnancy. Early identification of women with high-risk temperamental profiles, coupled with targeted interventions and enhanced social support, may reduce psychological distress, improve obstetric outcomes, and promote both maternal and neonatal health. Incorporating temperament assessment into routine prenatal care represents a valuable, evidence-based strategy for comprehensive maternal-fetal care.

Limitations

This study has several limitations that should be acknowledged. Potential confounders such as socioeconomic status, partner support, preexisting medical conditions, and environmental stressors were not fully controlled, and these factors may independently influence maternal psychological well-being and obstetric outcomes. Future research employing multivariate analyses, including logistic regression and structural equation modeling, is warranted to delineate the independent contribution of anxious temperament. Moreover, longitudinal studies that track maternal temperament, psychosocial stressors, and obstetric outcomes across gestation would provide valuable insights into temporal relationships, underlying mechanisms, and potential avenues for intervention.

Conclusion

An anxious temperament is associated with an increased risk of preterm birth and low birth weight. Routine screening for affective temperament traits during pregnancy may help identify at-risk individuals and guide early psychological interventions. Future research should include multivariate analyses to account for confounding factors such as socioeconomic status and social support.

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Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content, including study design, data collection, analysis and interpretation, writing, and some of the main line, or all of the preparation and scientific review of the contents, and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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